

Claims

- [c1] An integrated transport system for moving an object in an aircraft between a lower cabin and an upper cabin, the lower cabin and the upper cabin having a shaft in connection therebetween, comprising:
a single-unit gantry-lift device including an object carrier for receiving the object, said object carrier having at least one restraint member for securing the object in said object carrier and preventing the object from tipping, said single-unit gantry-lift device further including a lift device for moving said object carrier generally along a longitudinal axis of the shaft and a gantry device for moving said object carrier generally along at least one of a first axis of said upper cabin and a second axis disposed generally perpendicular to said first axis.
- [c2] The integrated transport system recited in claim 1 wherein said lower cabin is a main deck galley, said upper cabin being an overhead galley.
- [c3] The integrated transport system recited in claim 1 wherein said at least one restraint member is a selected from the group consisting of at least one belt member, at least one plate member, at least one netting member,

and at least one rope member.

- [c4] The integrated transport system recited in claim 1 wherein said lift device includes at least one of a pulley mechanism, a screw mechanism, and a gear mechanism for moving said object carrier along said longitudinal axis of said shaft.
- [c5] The integrated transport system recited in claim 1 wherein at least one of said lift device and said gantry device is a manually operated mechanism.
- [c6] An integrated transport system for moving an object in an aircraft between a lower cabin and an upper cabin, the lower cabin and the upper cabin having a shaft in connection therebetween, comprising:
a single-unit gantry-lift device including an object carrier for receiving the object, said object carrier having at least one restraint member for securing the object in said object carrier and preventing the object from tipping, said single-unit gantry-lift device further including a lift device for moving said object carrier generally along a longitudinal axis of the shaft and a gantry device for moving said object carrier generally along at least one of a first axis of the upper cabin and a second axis disposed generally perpendicular to said first axis; wherein said object carrier includes an unloading mech-

anism for unloading the object from said object carrier.

- [c7] An integrated transport system for moving an object in an aircraft between a lower cabin and an upper cabin, the lower cabin and the upper cabin having a shaft in connection therebetween, comprising:
a single-unit gantry-lift device including an object carrier for receiving the object, said object carrier having at least one restraint member for securing the object in said object carrier and preventing the object from tipping, said single-unit gantry-lift device further including a lift device for moving said object carrier generally along a longitudinal axis of the shaft and a gantry device for moving said object carrier generally along at least one of a first axis of the upper cabin and a second axis disposed generally perpendicular to said first axis; wherein said object carrier includes an unloading mechanism for unloading the object from said object carrier; wherein said gantry device includes a pair of rails coupled to said overhead sub-module, said pair of rails for suspending said object carrier therefrom and preventing said object carrier from tipping, said pair of rails further utilized for moving said object carrier generally along said first axis of said overhead sub-module.
- [c8] An aircraft comprising:
an airframe including a bi-level galley module with a

main-deck sub-module and an overhead sub-module disposed above said main-deck sub-module, said overhead sub-module for storing at least one object therein and having a first axis and a second axis disposed generally perpendicular to said first axis;

a shaft defined by said bi-level galley module and extending between said main-deck sub-module and said overhead sub-module, said shaft having a longitudinal axis;

an integrated transport system for moving an object through said shaft and between said main-deck sub-module and said overhead sub-module, said integrated transport system including a single-unit gantry-lift device comprised of a lift device for moving said object along said longitudinal axis and a gantry device for moving said object along at least one of said first axis and said second axis;

a ladder extending between said main-deck sub-module and said overhead sub-module for allowing ingress and egress to said overhead sub-module;

a walkway extending generally along said first axis of said overhead sub-module;

at least one storage area disposed adjacent to said walkway and offset therefrom in a direction generally along said second axis of said overhead sub-module, said at least one storage area also being located above said

walkway; and

at least one deployable receptacle disposed within said at least one storage area, said at least one deployable receptacle including a tray and a lever coupled to said tray, said tray for supporting an object thereon and being movable between a storing position and a deploying position, said tray storing said object when said tray is disposed in said storing position and deploying said object when said tray is disposed in said deploying position, said lever coupled to said tray for moving said tray between said storing position and said deploying position;

wherein said single-unit gantry-lift device further includes an object carrier for receiving said object, said object carrier having at least one restraint member for securing said object in said object carrier and an unloading mechanism for unloading said object from said object carrier;

wherein said gantry device includes a pair of rails coupled to said overhead sub-module, said pair of rails for suspending said object carrier therefrom and preventing said object carrier from tipping, said pair of rails further utilized for moving said object carrier generally along said first axis of said overhead sub-module.

[c9] The aircraft recited in claim 8 wherein said tray includes

at least one supporting surface for supporting said object.

- [c10] The aircraft recited in claim 9 wherein said at least one supporting surface is substantially horizontal when said tray is disposed in said storing position and said at least one supporting surface is tilted at a predetermined angle when said tray is disposed in said deploying position.
- [c11] The aircraft recited in claim 10 wherein said at least one supporting surface is a pan portion of said tray for supporting a series of wheels extending from said object and allowing said series of wheels to roll thereon.
- [c12] The aircraft recited in claim 10 wherein said at least one supporting surface is a pair of opposing ledge portions of said tray with a series of rolling members coupled thereto, said series of roller members for contacting a bottom portion of said object and moving said object thereacross.
- [c13] The aircraft recited in claim 8 wherein said tray has a distal end portion and a proximal end portion opposite to said distal end portion, said lever including a force arm, a resistance arm, and a fulcrum portion therebetween, said resistance arm being coupled to said distal end portion of said tray.

- [c14] The aircraft recited in claim 13 wherein said resistance arm of said lever is pivotally coupled to said distal end portion of said tray.
- [c15] The aircraft recited in claim 13 wherein said resistance arm of said lever is substantially horizontal when said tray is disposed midway between said storing position and said deploying position thereby minimizing an angle rotation of said lever and maximizing a height change of said distal portion of said tray when said lever is actuated to move said tray from said storing position to said deploying position.
- [c16] The aircraft recited in claim 13 further comprising:
 - a distal anchor member coupled to said fulcrum portion of said lever; and
 - a proximal anchor member coupled to said proximal end portion of said tray.
- [c17] The aircraft recited in claim 16 wherein said distal anchor member and said proximal anchor member comprise a one-piece base for mounting said tray thereon.
- [c18] The aircraft recited in claim 16 wherein said proximal anchor portion is pivotally coupled to said proximal end portion of said tray, said proximal end portion moving along an arcuate path when said tray is moved between

said storing position and said deploying position.

- [c19] The aircraft recited in claim 16 wherein said proximal anchor portion of said base member is slidably coupled to said proximal end portion of said tray so as to allow said proximal end portion to move in substantially horizontal path.
- [c20] The aircraft recited in claim 16 wherein said proximal anchor portion of said base member is coupled to said proximal end portion of said tray via at least one of a pin and slot fastening pair and a linkage bar.
- [c21] The aircraft recited in claim 8 wherein said lever is coupled to at least one of a solenoid device, a hydraulic device, an electronic servo device, and a pedal portion for actuation by a person.
- [c22] A deployable receptacle comprising:
 - a tray for supporting an object thereon and being movable between a storing position and a deploying position, said tray storing an object thereon when said tray is disposed in said storing position and deploying said object therefrom when said tray is disposed in said deploying position; and
 - a lever coupled to said tray for moving said tray between said storing position and said deploying position.

- [c23] The deployable receptacle recited in claim 22 wherein said tray includes at least one supporting surface for supporting said object.
- [c24] The deployable receptacle recited in claim 23 wherein said at least one supporting surface is substantially horizontal when said tray is disposed in said storing position and said at least one supporting surface is tilted at a predetermined angle when said tray is disposed in said deploying position.
- [c25] The deployable receptacle recited in claim 23 wherein said at least one supporting surface is a pan portion of said tray for supporting a series of wheels extending from said object and allowing said series of wheels to roll thereon.
- [c26] The deployable receptacle recited in claim 23 wherein said at least one supporting surface is a pair of opposing ledge portions of said tray with a series of rolling members coupled thereto, said series of roller members for contacting a bottom portion of said object and moving said object thereacross.
- [c27] The deployable receptacle recited in claim 22 wherein said tray has a distal end portion and a proximal end portion opposite to said distal end portion, said lever in-

cludes a force arm, a resistance arm, and a fulcrum portion therebetween, said resistance arm being coupled to said distal end portion of said tray.

- [c28] The deployable receptacle recited in claim 27 wherein said resistance arm of said lever is substantially horizontal when said tray is disposed midway between said storing position and said deploying position thereby minimizing an angle rotation of said lever and maximizing a height change of said distal portion of said tray when said lever is actuated to move said tray from said storing position to said deploying position.
- [c29] The deployable receptacle recited in claim 27 further comprising:
 - a distal anchor member coupled to said fulcrum portion of said lever; and
 - a proximal anchor member coupled to said proximal end portion of said tray.
- [c30] The deployable receptacle recited in claim 29 wherein said distal anchor member and said proximal anchor member comprise a one-piece base for mounting said tray thereon.
- [c31] The deployable receptacle recited in claim 29 wherein said proximal anchor member is pivotally coupled to said

proximal end portion of said tray, said proximal anchor portion moving along an arcuate path when said tray is moved between said storing position and said deploying position.

- [c32] The deployable receptacle recited in claim 29 wherein said proximal end portion of said tray is slidably coupled to said proximal anchor member so as to allow said proximal end portion to move in a substantially horizontal path.
- [c33] The deployable receptacle recited in claim 29 wherein said proximal anchor portion of said base member is coupled to said proximal end portion of said tray via at least one of a pin and slot fastening pair and a linkage bar.
- [c34] The deployable receptacle recited in claim 22 wherein said force arm of said lever is coupled to at least one of a solenoid device, a hydraulic device, an electronic servo device, and a pedal portion for actuation by a person.
- [c35] A method for transporting an object in an aircraft with a main cabin, an overhead cabin disposed above the main cabin, and a shaft in connection between the main cabin and the overhead cabin, comprising:
securing an object to an object carrier of the integrated

transport system;
actuating a lift device of a single-unit gantry-lift device for moving said object generally along a longitudinal axis of the shaft;
actuating a gantry device of said single-unit gantry-lift device for moving said object generally along at least one of a first axis of the overhead cabin; and
moving said object generally along a second axis disposed substantially perpendicular to said first axis;
wherein moving said object generally along said second axis comprises moving said object between said object carrier and a storage area in said overhead cabin.

- [c36] The method recited in claim 35 further comprising:
actuating a lever of a deployable receptacle;
moving a tray of said deployable receptacle from a storing position to a deploying position; and
deploying the object from said deployable receptacle.
- [c37] The method in claim 35 wherein securing said object to said object carrier comprises:
coupling said object to said object carrier via at least one restraint member selected from the group consisting of at least one belt member, at least one plate member, at least one netting member, and at least one rope member.

- [c38] The method in claim 35 wherein actuating said lift device comprises at least one of:
manually operating at least one of a pulley mechanism, a screw mechanism, and a gear mechanism for moving said object along said longitudinal axis of said shaft; and actuating a motor for moving said object along said longitudinal axis of said shaft.
- [c39] The method in claim 35 wherein actuating a gantry device comprises at least one of:
manually operating at least one of a rolling member and a sliding member for moving said object along said first axis of said upper cabin; and actuating a motor for moving said object along said first axis of said upper cabin.
- [c40] The method in claim 35 further comprising:
entering the upper cabin via at least one of a ladder and a staircase extending between the lower cabin and the upper cabin.